

On-land Visual Trash Assessment and Full Capture Equivalency Training



SACRAMENTO - OCT 17 & 18, 2017

RIVERSIDE – OCT 31 & NOV 1, 2017



Training Agenda – Day Two

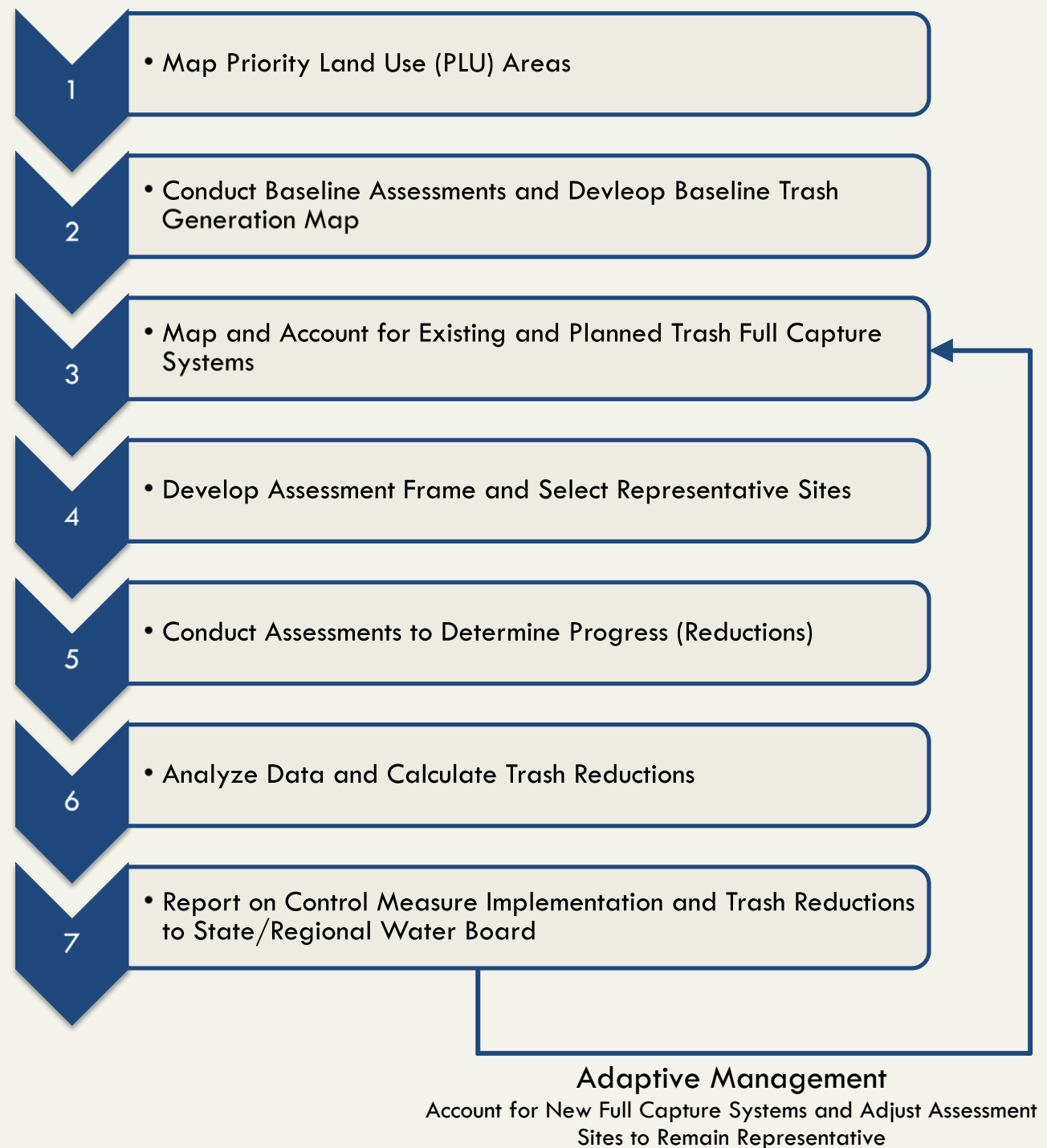
9:00 am	Agenda Overview
9:10 am	Field Work Debrief – Continued
9:40 am	Using OVTA Results - Developing a Baseline Trash Generation Map and Calculating a Baseline Trash Load
10:15 am	Demonstration of Trash Reductions/Progress – Part 1
11:00 am	<i>Break</i>
11:15 am	Demonstration of Trash Reductions/Progress – Part 2
12:15 pm	<i>Lunch</i>
1:30 pm	Question and Answer on Full Capture Equivalency via OVTAs
2:00 pm	Approaches to Trash Receiving Water Monitoring
3:45 pm	Wrap Up/Evaluation

OVRTA Field Work Debrief



Track 2 (Full Capture Equivalency) Roadmap

On-land Visual Trash Assessment Approach



Step #1 – Priority Land Use (PLU) Areas

WHERE ARE CONTROLS REQUIRED? PRIORITY LAND USE (PLU) AREAS (OR EQUIVALENT)

- **High Density Residential (HDR)** - ≥ 10 du/acre
- **Industrial** – product manufacture, storage or distribution
- **Commercial** – sale/transfer of goods/services to consumers
- **Mixed Urban** – intermixed HDR, industrial, and/or commercial
- **Public Transportation Stations** – facilities/sites where public transit agencies' vehicles load/unload passengers or goods



PLU Area Rosetta Stone

Land Use Categories	Definition in Trash Amendments	Land Use Classes Included in Each Category
Priority Land Uses (PLUs)		
High-Density Residential	Residential land uses with at least ten (10) developed dwelling units (DU) per acre	<ul style="list-style-type: none"> • Single family residential parcels < 0.1 acre in size • Multi-family residential parcels identified as >10 DUs per acre or < 0.1 acre, including applicable apartments, townhomes, condominiums and trailer parks
Industrial	Land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution	<ul style="list-style-type: none"> • Heavy industrial buildings/facilities • Warehouses and equipment storage lots • Junkyards, landfills and waste recycling centers and transfer stations • Wholesale businesses and distribution centers • Building material sales yards • Other light industrial facilities
Commercial	Land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers	<ul style="list-style-type: none"> • Retail establishments, including restaurants, theaters, shops, convenience stores, gas stations and grocery stores • Business or professional buildings • Community centers • Vehicle repair shops • Motels and hotels • Government buildings • Parking lots
Mixed Urban	Land uses where high-density residential, industrial, and/or commercial land uses predominate collectively	<ul style="list-style-type: none"> • Mixed use land areas that have a combination of two or more classes above
Public Transportation Stations	Facilities or sites where public transit agencies' vehicles load or unload passengers or goods	<ul style="list-style-type: none"> • Bus stations and stops • Park and ride lots • Rail stations and ferry terminals • Associated parking lots

.... AND EQUIVALENT ALTERNATE LAND AREAS

- May substitute one or more land areas/uses with alternate land areas that generate trash at an equivalent or greater level
- Areas generating equivalent levels of trash may be established using existing or new information/data
- Approval Of Permitting Authority
 - Track 1 – Approval Required
 - Track 2 – Subject to Approval
- More on this later in the day



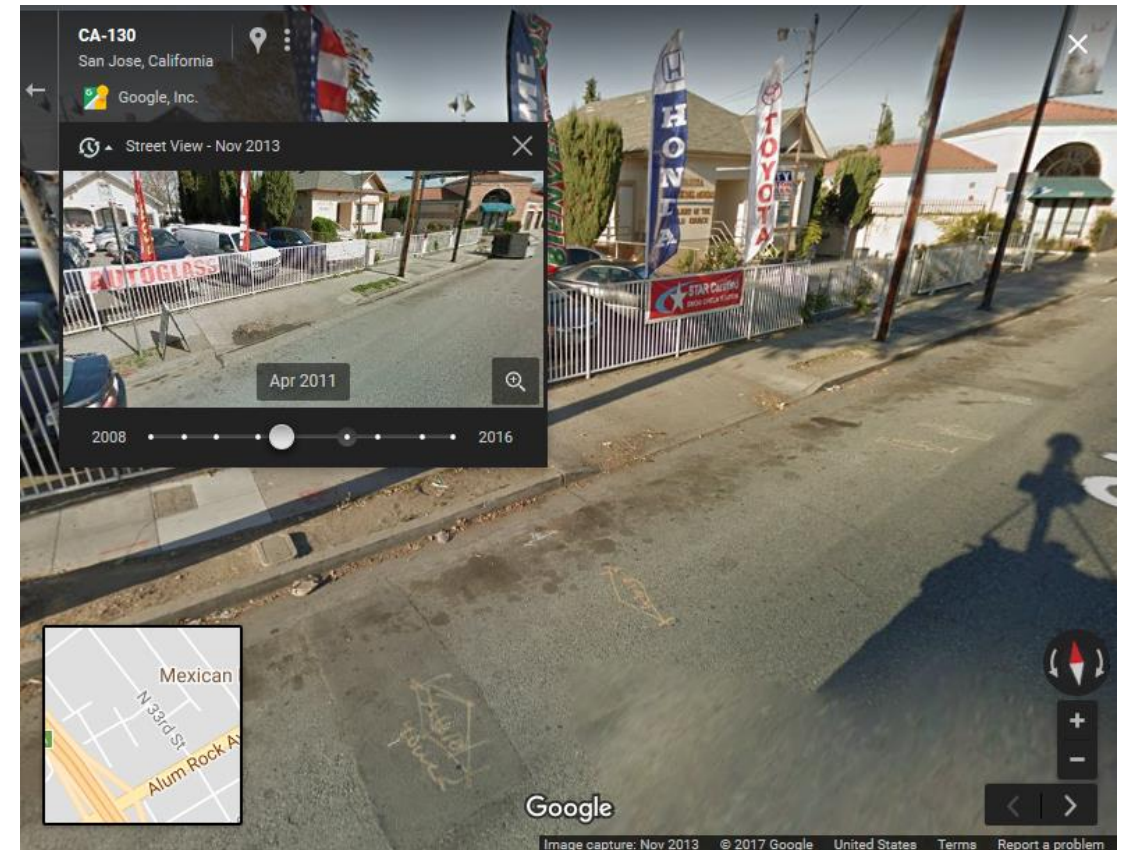
Step #2

Assess Baseline Trash Levels and Develop Map

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Assess Baseline Trash Levels and Develop Map

- **On-land Visual Trash Assessments**
 - State Water Board - Recommended Trash Assessment Minimum Level of Effort for Establishing Baseline Trash Generation Levels
- **Virtual Assessments using Google Earth Street View™**
 - Lack of knowledge of photo timeframe
 - Cars on streets blocking trash
 - No photos for area-based assessments
- **Knowledge of Public Agency staff**

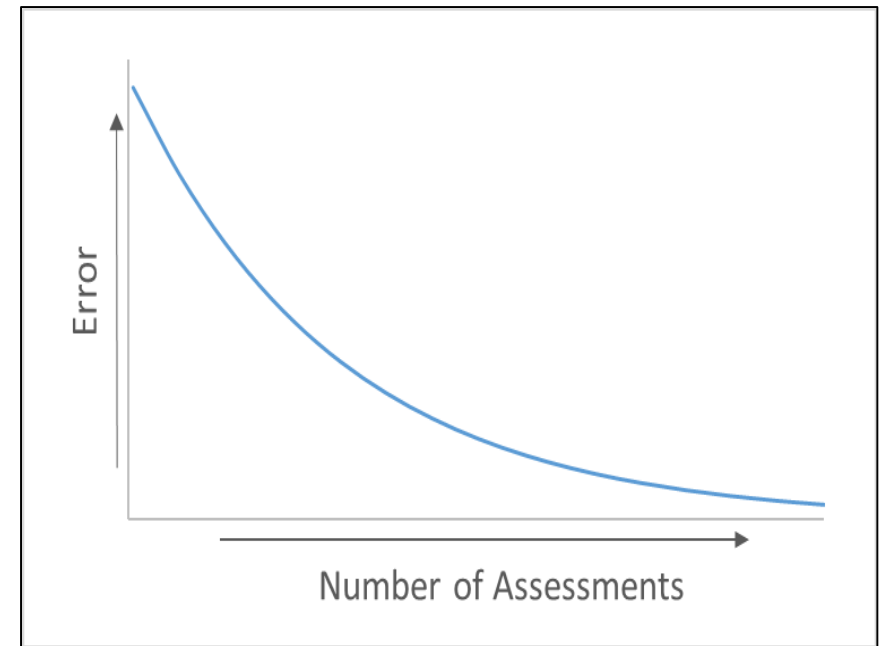


Adequate # OVTAs to Establish Baseline

Temporal Variance Evaluation

- 54 sites with 6 or more assessments
- Scores converted to numeric
 - (A=0, B=1, C=2, D=3)
- **Actual Baseline** = Average Score of all assessments
- **Possible Baseline** = Subsampled all unique combinations
 - Four (n=15), three (n=20), two (n=15), and one (n=6)

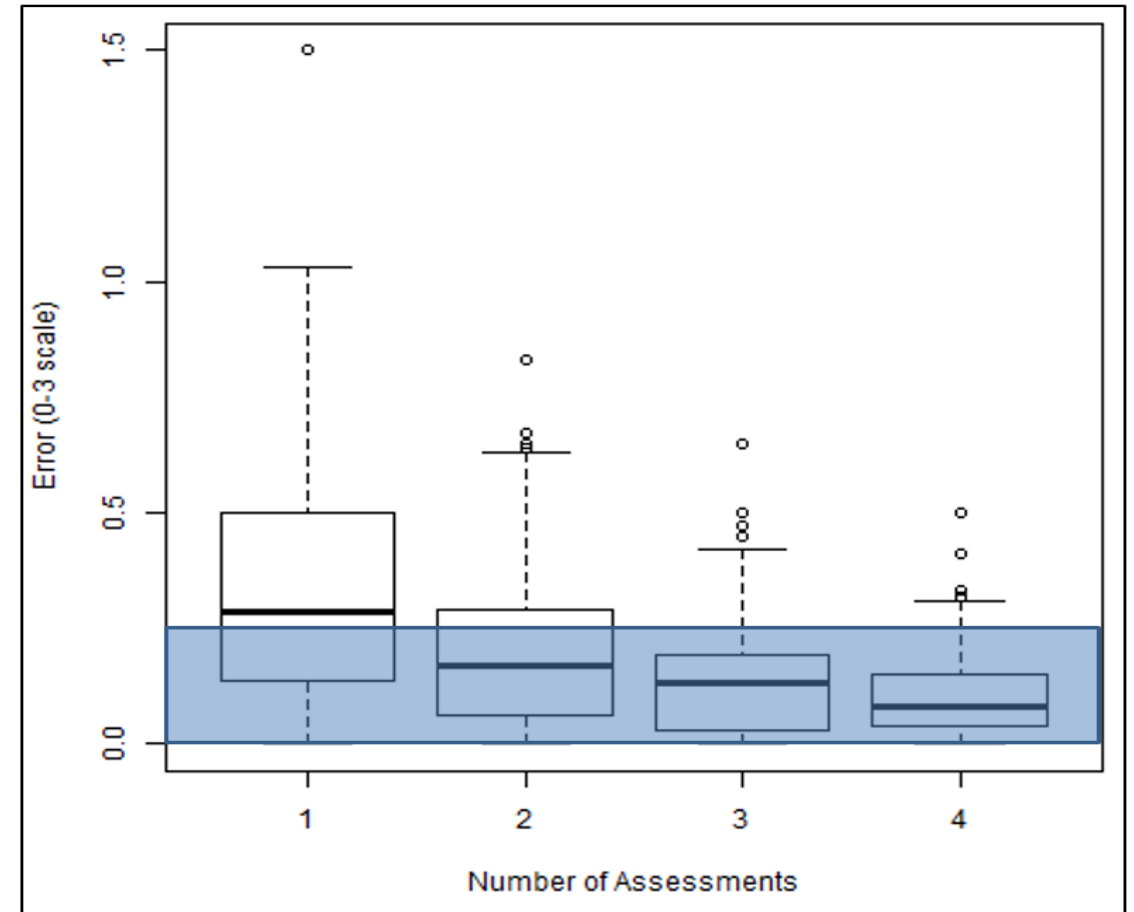
$$\text{Error} = |\text{Actual Baseline} - \text{Possible Baseline}|$$



Recommended # Assessments for Baseline

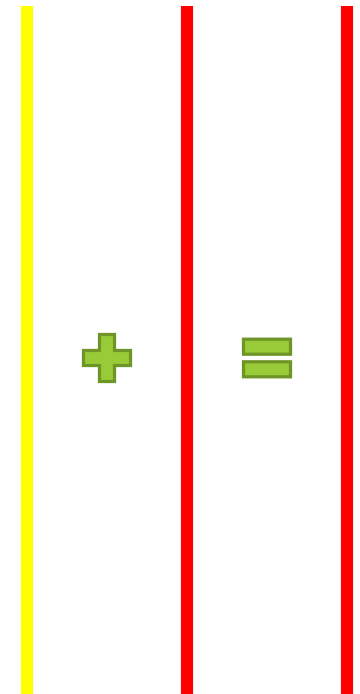
Tracking California's Trash (BASMAA 2017)

- Acceptable Error – 0.25
(i.e., off by $\frac{1}{4}$ of OVTA score)
- Risk of being outside of the acceptable error level
 - 1 Assessment - 46%
 - 2 Assessments - 70%
 - 3 Assessments - 84%
 - 4 Assessments - 93%



Mapping OVTA Results

- Streets/sidewalk or area-based results determine baseline trash levels of adjacent parcels/properties
 - *Example: If OVTA level is “B”, adjacent parcel is turned moderate (yellow on map)*
- Defer to highest trash level observed when creating baseline maps
 - *Example: If OVTA level on a city block is “B” one time, then “C” another, adjacent parcels are turned red (high on map)*
- To the extent possible, trash levels on maps should be “smoothed” and relatively low resolution to avoid parcel-by-parcel baseline illustrations of different trash levels within the same general areas (e.g., commercial zones)



Developing Baseline Trash Generation

Protocol B - Driving Surveys

OVTA Driving
Observations



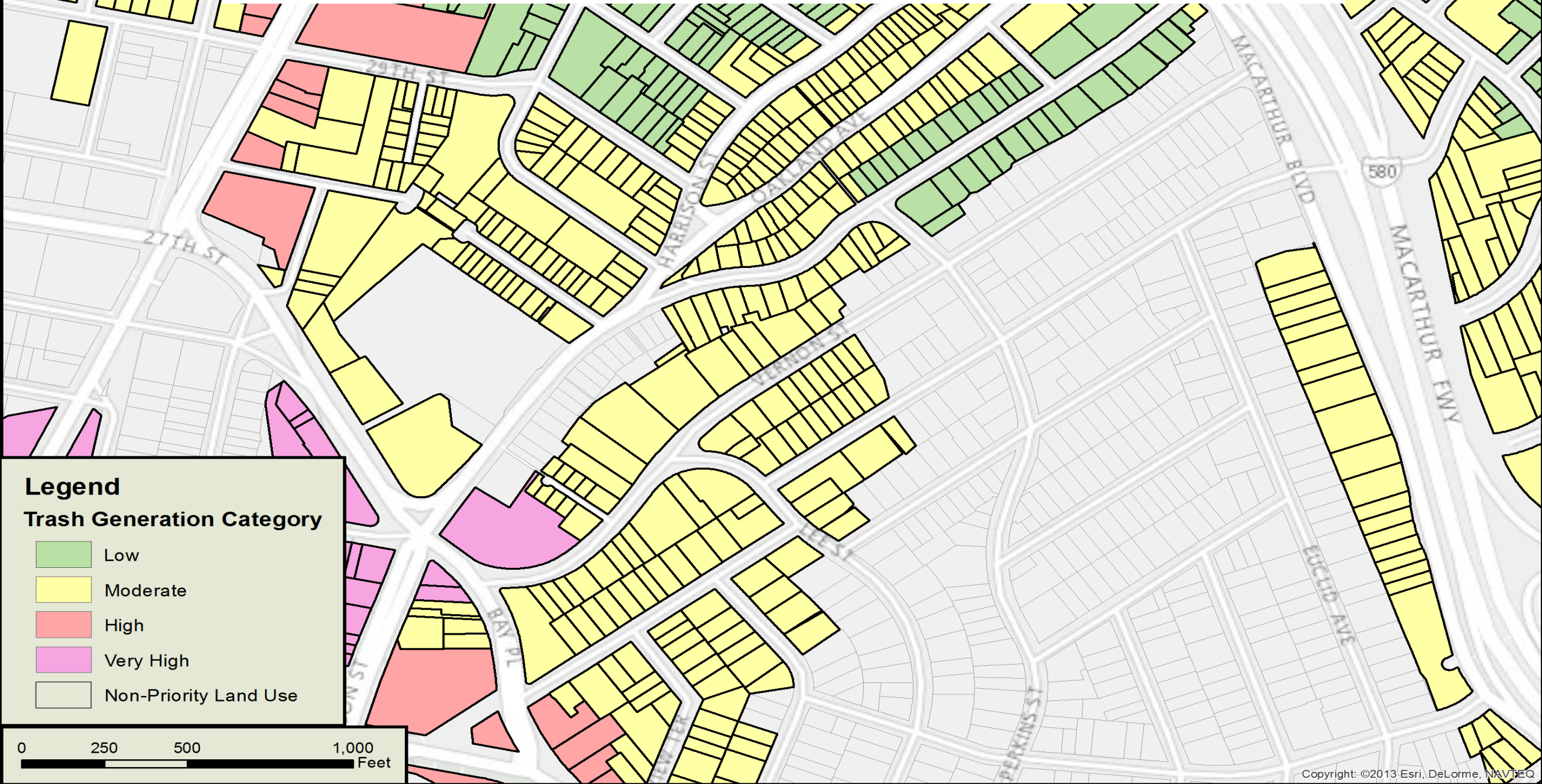
OVTA Photo Score



Final Score
“Rounded up”

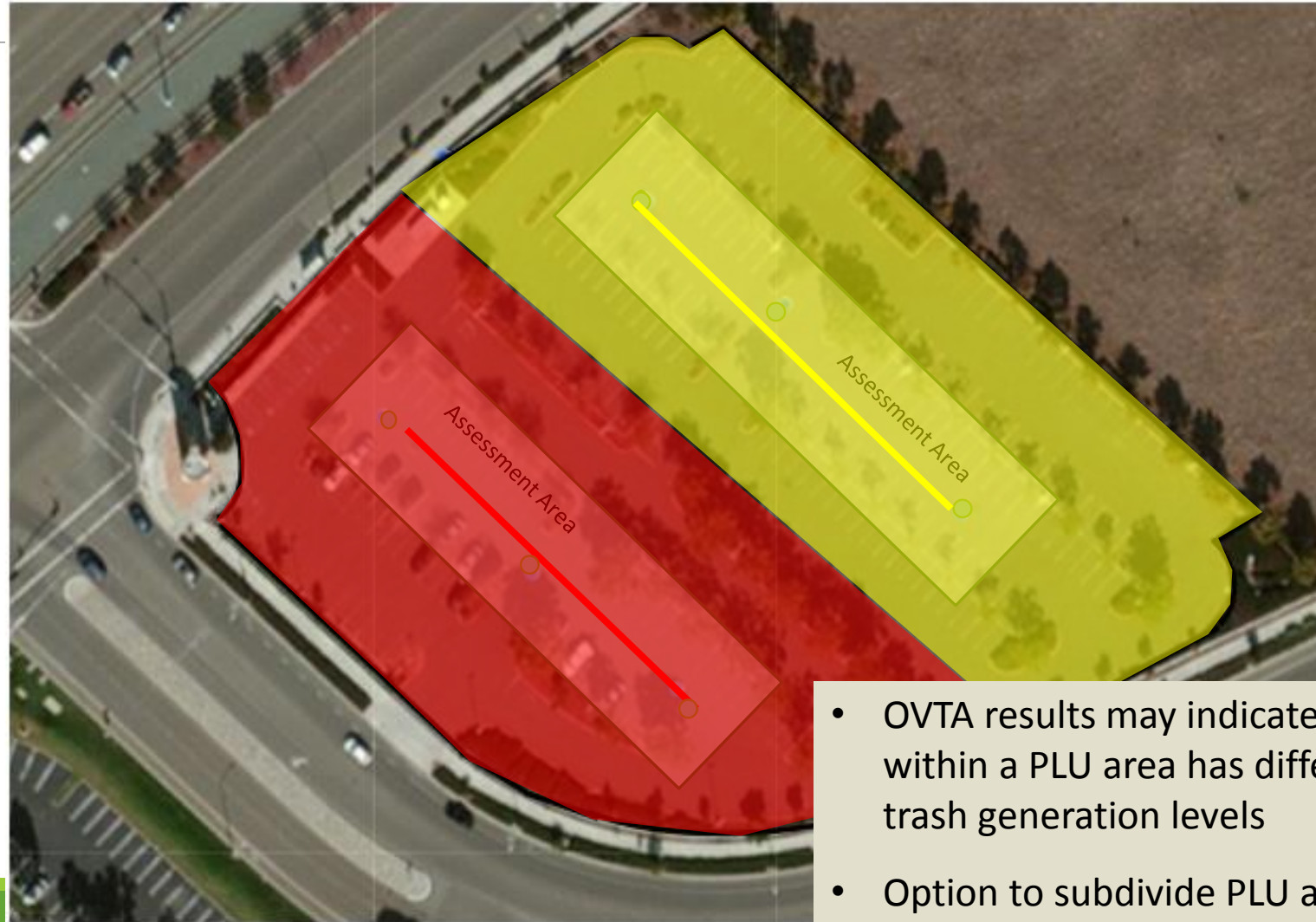


Developing a Baseline Trash Generation Map



Mapping OVTA Results

Subdividing PLUs based on Area Assessments



- OVTA results may indicate that areas within a PLU area has different baseline trash generation levels
- Option to subdivide PLU area when applying results – use judiciously

Using the Trash Generation Map to Establish a Baseline Load

- Similar to process used in SF Bay Area
- Use of established average trash generation rates (gal/acre yr⁻¹)
- Provides for starting point to assess progress over time
- Allows for equitable substitution for equivalent alternative land areas

Trash Levels

Trash Level	Map Display	On-land Visual Assessment Score	~Mean Generation Rate (gal / acre / year)
Low	Green	A	NA*
Medium	Yellow	B	7.5
High	Red	C	30
Very High	Purple	D	100

*Achieved Full Capture Equivalency

Baseline Trash Load

(gal/yr)

Load for Specific Trash Gen Category

$$Load_{cat-X} = Mean\ Rate_{cat-X} \times Acres_{cat-X}$$

Load for All Categories (Total Load)

$$Load_{cat-M} + Load_{cat-H} + Load_{cat-VH}$$

Example – Baseline Trash Load (350 PLU Acres)

Category	Low	Moderate	High	Very High	Totals
Average Trash Generation Rate (gallons/acre yr ⁻¹)	NA	7.5	30	100	-
PLU Area (Acres)	100	100	150	0	350
Estimated Annual Baseline Trash Load (gallons)	NA	750	4,500	0	5,250

Special Case

Public Transportation Stations - Bus Stops

- Bus Stops
 - Defined Priority Land Use (PLU) Area
 - Vary in sizes, shapes and location (rural vs. urban)
- Proposed definition of Applicable Area
 - Standardize dimensions - 20 feet in length, by 10 feet in width (200 ft²)
 - If adjacent to other PLU area – do not include in PLU Area to avoid overlap
 - If not adjacent to other PLU area – assume 200 ft² area and assign baseline trash generation level via assessment(s) or virtual assessment(s)



Incorporating Alternative Equivalent Land Areas into Baseline Trash Generation Maps

- Clear documentation (via assessments) that baseline trash levels in alternative equivalent areas are greater than or equal to baseline levels in PLU areas being substituted for (show the math)
- Identify equivalent areas on baseline trash generation maps
- Remove PLU areas being substituted for from baseline maps



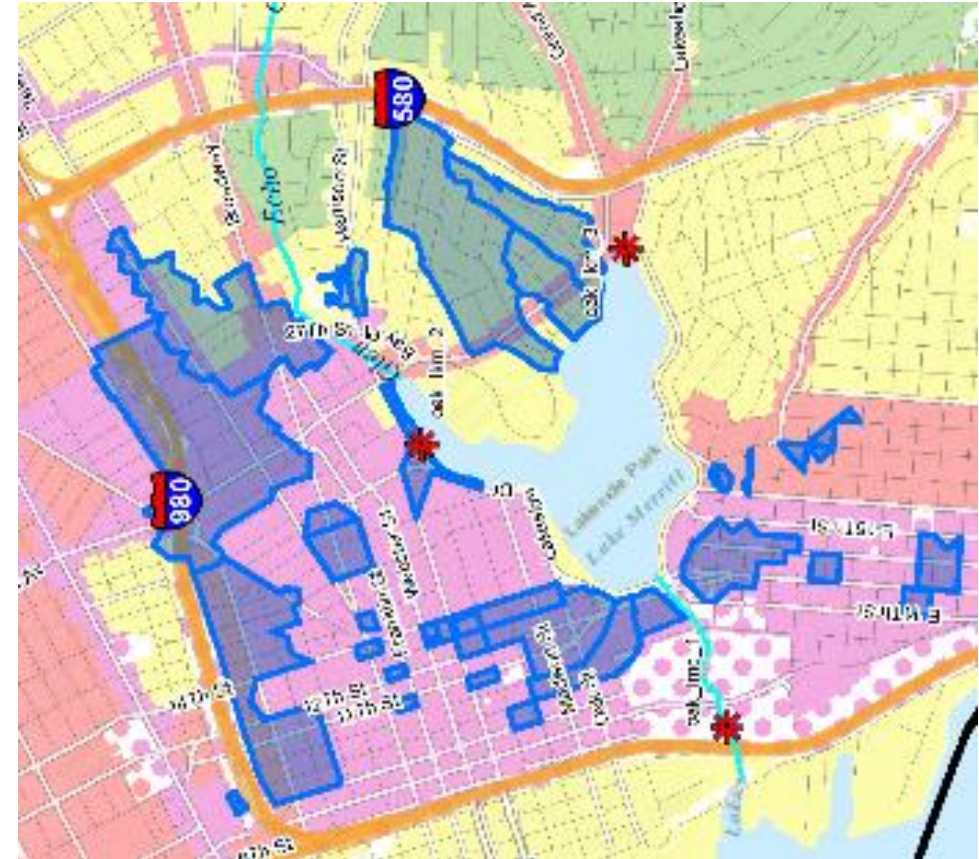
Step #3

Map and Account for Existing and Planned Full Capture Systems

Step #3

Delineate AND MAP Land Areas Treated by Full Capture Systems

- To account for trash reductions associated with full capture systems, areas “treated” by these devices need to be delineated
- Provides for load reductions from equivalent alternative land areas to be accounted for



Delineating Trash Full Capture Treatment Areas

- **Inlet-based Devices**
 - Combination of desktop and field surveys
 - Identifies areas draining to inlets on private property
- **Large Devices**
 - Engineering designs & plans
 - Areas draining to inlets on private property usually included in treatment area



Full Capture System Operation and Maintenance

- Full Capture Design Standard dependent on adequate O&M Program
 - Frequent bypassing if not maintained
- Standard Operating Procedures (SOPs)
 - Equipment
 - Training
 - Inspections vs. Cleaning Frequencies
- Tracking, Reporting and Modifying



Example Maintenance Frequencies

SF Bay Example

- **Inlet-based Devices**
 - Minimum Frequency - 2x cleaning per year
 - Increased Frequency - if device is plugged/blinded causing overflow or bypass **OR** >50 percent “full”
- **Large Devices**
 - Minimum Frequency
 - Device specific
 - 1x cleaning per year
 - Increased Frequency - if device >50 percent “full”

Los Angeles Example

No differentiation between inlet-based and large devices

Inspections:

- **Priority A:** highest volumes of trash and/or debris 3x during wet season, 1x during dry season
- **Priority B:** moderate volumes of trash and/or debris 1x during wet season, 1x during dry season
- **Priority C:** low volumes of trash and/or debris 1x

Cleaning:

- Based on inspection results
- >25% full triggers clean out

Morning Break

Step #4

Develop an OVTA Assessment Frame & Select Representative Sites

(For Areas *NOT* Treated by Full Capture)

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Develop an OVTA Assessment Frame & Select Representative Sites
(For Areas *NOT* Treated by Full Capture)

PHASE I TRADITIONALS

Curb line adjacent to PLU Areas
with Moderate, High and Very
High baseline levels

PHASE II NON-TRADITIONALS

Assessment Areas within PLU areas
with Moderate, High and Very High
baseline levels

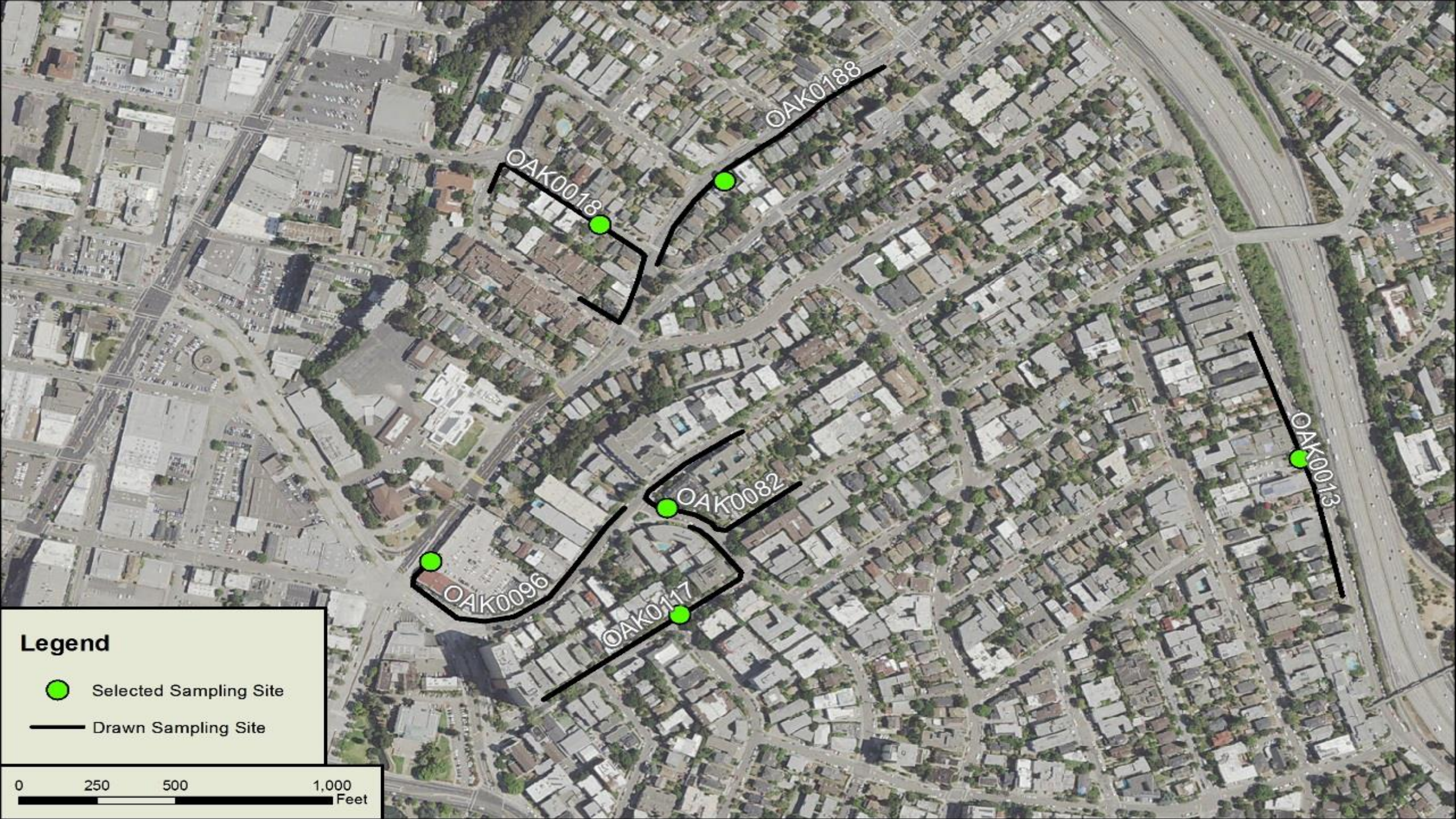
Excluded from Assessment Frame

Low Trash Generation Areas and Areas Treated by Full Capture

Process to Develop a Street/Sidewalk Assessment Frame


1. Buffer street center lines to create curb lines
2. Attribute curb lines with generation levels (colors) based on adjacent properties
3. Remove curb lines that are: 1) low trash generating or 2) treated by full capture systems
4. Select point at 500 ft increments along remaining curb line
5. Randomize points and assign IDs
6. Beginning with the first site on list, draw 1,000 ft sites along assessment frame

Goal: 10% of curb miles and representative of proportions of acres with moderate, high and very high trash generation levels



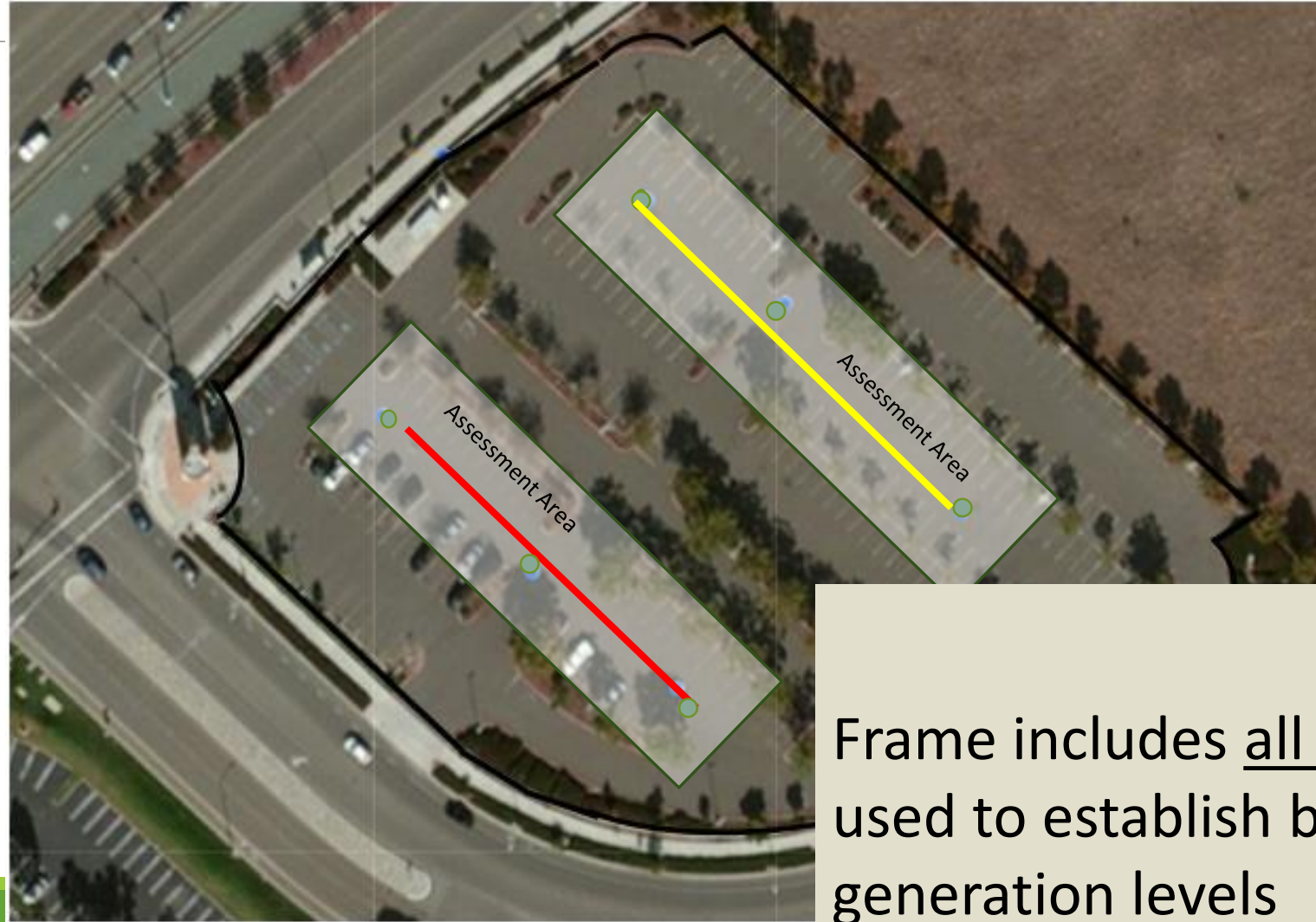
Legend

 Selected Sampling Site

 Drawn Sampling Site

0 250 500 1,000 Feet

Assessment Frame for Area-based Assessments



Frame includes all transects used to establish baseline trash generation levels

Assessment Frame Details

	Traditional MS4s	Non-traditional MS4s
Type	Curb lines	Areas (via transects)
# Sites or Size of Area	10% of all curb miles associated PLU areas with M, H or VH generation and are NOT treated by FC systems	All transects used to develop baseline trash generation levels in PLUs with M, H or VH baseline levels
Location of Sites	Randomly selected	Transects established through storm drain inlets

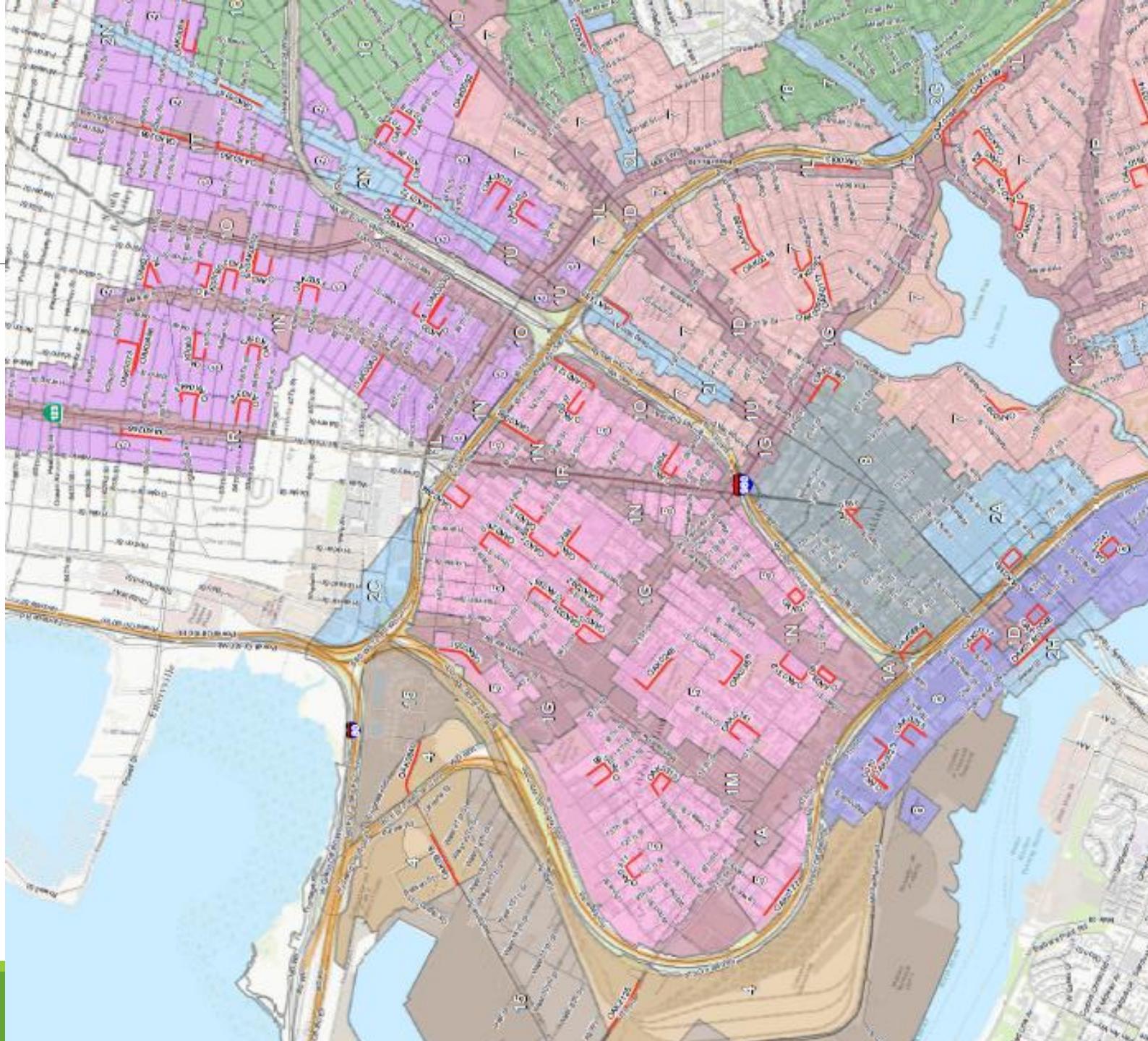
Representativeness of Street/Sidewalk Based Assessment Sites/Areas

UNBALANCED POPULATION OF SITES

Trash Level	Baseline Acres	Assessment Frame (Curb Line Network)	Difference
Low (A)	NA	NA	NA
Mod (B)	50%	40%	-10%
High (C)	25%	10%	-15%
Very High (D)	25%	50%	+25%

BALANCED POPULATION OF SITES

Trash Level	Baseline Acres	Assessment Frame (Curb Line Network)	Difference
Low (A)	NA	NA	NA
Mod (B)	50%	48%	-2%
High (C)	25%	27%	+2%
Very High (D)	25%	25%	-



Step #5

Conduct Assessments to Determine Progress

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Conduct Assessments to Determine Progress

- **Frequency of Assessments**

- At least 3 OVTAs per year (on average) at each site/area

- **Timing of Assessments**

- Approximately half-way between reoccurring control measure events (e.g., street sweeping)
- No sooner than 48 hours following a significant rainfall event (>0.5 inches in 24 hrs)

- **# of Assessors**

- At least two trained assessors

- **Averaging Period**

- Depends on multiple factors
- Default = 2 year periods (6 assessments)

OVTA Frequency for Assessing Progress

*Tracking California's
Trash (BASMAA 2017)*



Step #6

Analyze Data and Calculate Trash Reductions

Step #6 – Analyze Data and Calculate Trash Reductions

Trash Reduction (%)

$$\frac{\text{Load Reduced via FC Systems} + \text{Load Reduced via Other Actions}}{\text{Baseline Trash Load}} \times 100$$

From Delineation of FC Systems

From Baseline Trash Generation Map

From OVTA Program Results

Trash Load Reduced

Full Capture Systems

1. Calculate the **area treated** in each trash generation category on your baseline map
2. Multiple each acreage by the associated trash generation rate to get **trash load reduced** by full capture systems



Example - Trash Load Calculation Process for Trash Full Capture Systems

Baseline

Category	Low (0)	Moderate (7.5)	High (30)	Very High (100)	Totals
Baseline Area (Acres)	100	100	150	0	350
Baseline Trash Load (gallons)	NA	750	4,500	0	5,250

Trash Full Capture

Category	Low (0)	Moderate (7.5)	High (30)	Very High (100)	Totals
Area Treated (Acres)	NA	10	50	0	60
Trash Load Reduced (gallons)	NA	75	1500	0	1575

30% Reduction (1,575/5,250)

$5,250 - 1,575 = 3,675$ (Trash Load Remaining)

Trash Load Reduced

Other Controls via OVTA Results

1. For each assessment site, calculate the **average linear street feet** that was observed in each OVTA category during all assessment events
2. Calculate the **total average linear street feet** in each category for all sites combined
3. Calculate the **% total average linear street feet** in each category by dividing the total average linear street feet in the category, by the total average linear street feet for all categories combined

EXAMPLE

Calculating “Current” Trash Levels based on OVTAs

		TMA Assessment Site						
		Assessment Event	001	002	003	004		
			1					
			2					
			3					
			4					
			5					
		6						
							Total Ave Linear Street Feet	%
Ave Linear Street Feet	Low	0	167	83	750	1000	25%	
	Mod	250	833	750	250	2083	52%	
	High	750	0	167	0	917	23%	
	Very High	0	0	0	0	0	0%	
	Total	1000	1000	1000	1000	4000	100%	

Trash Load Reduced Other Controls via OVTA Results

4. Calculate the **current acreage** in each category by multiplying the % of average linear street feet (calculated in Step #3) by the total PLU area (acreage) in the municipality associated with “Other” (Non FC System) controls
5. To derive “**Current Trash Levels**” for Track 2 PLU areas, multiply the current acreage in each category (calculated in Step #4) by the associated mean trash generation rate and sum

Example - Trash load Reduction Calculation process

Other (Track 2) Measures OVTA Results

After Accounting for Full Capture

Category	Low	Moderate	High	Very High	Totals
Area (Acres)	NA (160)	90	100	0	190
Area (%)	NA	48%	52%	0%	100%
Trash Load (gallons)	NA	675	3000	0	3,675

Other Measures (OVTA Results)

Category	Low (0)	Multiply x 190 acres			Very High (100)	Totals
OVTA Results (%)	25%	52%	23%	0%	100%	
Area After Accounting for OVTA Results (Acres)	48	98	44	0	190	
Trash Load After Accounting for OVTA Results (gallons)	0	735	304	0	1,039	

$3,675 - 1,039 =$
 2,636 (Load Reduction)
 50% Reduction
 (2,636/5,250)

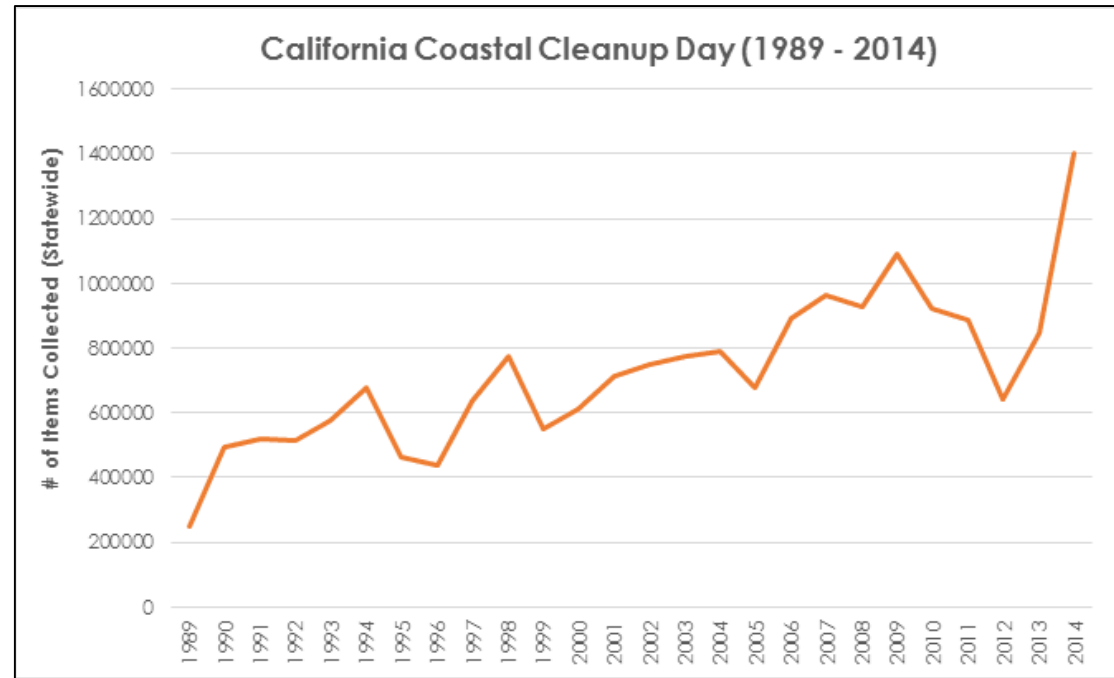
Progress Towards Addressing Trash Requirements

% Trash Reduction

Category	Low	Moderate	High	Very High	Totals	Cumulative % Reduction
Baseline	100	100	150	0	350	-
After Full Capture (Acres)	160	90	100	0	350	30%
After Full Capture and Other Actions (Acres)	208	98	44	0	350	80%

Consideration of Trash Reduction Offsets for Cleanups in Receiving Waters

- Millions of gallons of trash removed from receiving waters every year
 - Volunteer efforts
 - Permittee staff
 - NGOs
- Direct water quality benefit
- Engagement of community members



Region 2 (SF Bay) Offset for Receiving Water Cleanups

- **Load reduction benefit specific to each Permittee**
 - Benefit is relative to contribution of trash from applicable Permittee's MS4
 - Comparison of volume removed via cleanups to Permittee's baseline trash load
- **Maximum 10% load reduction offset allowed by each Permittee**
 - Avoids Permittees detouring all resources from MS4 controls to receiving water cleanups
- **3:1 offset to account for “discharge” having already occurred**



Region 2 (SF Bay) Offset for Receiving Water Cleanups

Calculation Process

1% Trash Reduction = Removal of X gallons of Trash from Receiving Waters

where: $X = \text{Baseline Trash Load} \times 0.03$

- *Calculated annually*
- *Must be a sustained effort (2 or more cleanups of an area/site)*

Progress Towards Addressing Trash Requirements

% Trash Reduction

Category	Low	Moderate	High	Very High	Totals	Cumulative % Reduction
Baseline	100	100	150	0	350	-
After Full Capture (Acres)	160	90	100	0	350	30%
After Full Capture and Other Actions (Acres)	208	98	44	0	350	80%
Receiving Water Cleanup Offset	-	-	-	-	-	90%

Step #6

Tracking and Reporting

Step #7 - Reporting

- **Full Capture**

- Number and type of FC systems installed to-date
- Trash generating areas (i.e., PLU acres in very high, high or moderate generation categories) treated by full capture to-date
- Percent of baseline trash from all PLU areas reduced via full capture systems
- Summary of full capture operation and maintenance activities conducted during the reporting year, including average frequencies of inspection and maintenance for all systems
- Any special problems observed such as flooding, screen blinding or plugging from leaves, or other negative conditions.

Step #7 - Reporting

- **Other Actions/OVTAs**
 - Descriptions of Other Trash Control Measures Implemented
 - Magnitude and frequency of OVTAs conducted and associated results
 - Trash generating areas (i.e., PLU acres in very high, high or moderate generation categories) addressed by other control measures
 - Percent of baseline trash from all PLU areas reduced via other control measures
- **Offsets for Receiving Water Cleanups**
 - Number and location of cleanup events
 - Volumes of trash removed and photographs
 - Percent reduction

Step #7
Adaptively Managing the
Full Capture Equivalent Program

Adaptively Managing the OVTA Full Capture Equivalent Program

- Field team member training and intercalibration
 - Using the same measuring stick
- Rebalancing of Assessment Sites
 - Due to installation of additional trash full capture systems
 - May need new sites established

Available Resources

(http://eoainc.com/ovta_fc/)

	OVTA Protocol	When to Use
A	Street and Sidewalk Survey	Situations where priority land areas are generally draining to storm drain <u>inlets located on streets</u> , and <u>sidewalks are present</u> and safe to walk
B	Driving Survey	Situations where priority land areas are generally draining to storm drain <u>inlets located on streets</u> , but <u>sidewalks are not present</u> or it is generally unsafe to walk
C	Area-based Survey (<i>Under Development</i>)	Situations where priority land use areas are <u>not draining to storm drain inlets located on streets</u> , rather they are draining to inlets on parcels

Guidance Document (Full Cap Equivalent Using OVTAs) – *Under Development*

Trainings – *Under Development via CASQA*

Lunch



Post-Lunch Questions and Answers